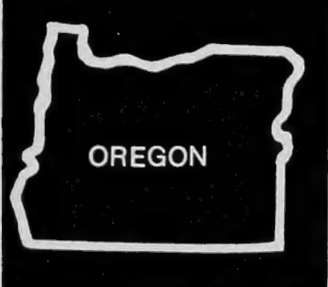


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# USDA FOREST SERVICE RESEARCH NOTE

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## AMMONIUM THIOCYANATE DOES NOT INCREASE HERBICIDAL CONTROL OF SALMONBERRY

by

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PROCUREMENT SECTION  
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### ABSTRACT

Addition of ammonium thiocyanate to sprays containing 2,4,5-T or silvex does not increase control of salmonberry shrubs compared to the two herbicides applied alone; both herbicides were more effective when applied in late spring than in midsummer. Ammonium thiocyanate markedly improved degree of salmonberry control obtained with amitrole.

**KEYWORDS:** Herbicides (-forest weed control, brush control, salmonberry, ammonium thiocyanate).

### INTRODUCTION

Salmonberry (*Rubus spectabilis*) shrubs quickly occupy freshly burned or newly harvested areas of highly productive forest lands in the Coast Ranges of Oregon and Washington. If not controlled, salmonberry will form a dense canopy and reduce survival and growth of desirable conifer seedlings (Ruth 1956). Control sufficient to release established conifers can be obtained with foliage sprays of 2,4,5-T (2,4,5-trichlorophenoxy) acetic acid, silvex (2,4,5-trichlorophenoxy) propionic acid, or amitrole [3-amino-s-triazole] (Gratkowski 1971, Krygier and Ruth 1961, Stewart 1974a). Amitrole-T, a 1:1 mixture of amitrole and ammonium thiocyanate [ $\text{NH}_4\text{SCN}$ ], is also effective on salmonberry (Gratkowski 1971, Stewart 1974a).

Salmonberry shrubs resprout from roots and bases of stems following treatment with herbicides, and repeated spraying is necessary on some areas to prevent resprouting shrubs from again dominating the site. More effective herbicidal treatments are desired to reduce the need for respraying. Several studies have shown that ammonium thiocyanate at rates as low as 1/4 to 3/4 lb per acre (0.28 to 0.84 kg per ha) can enhance the effectiveness of phenoxy herbicides on rangeland shrubs (Başler et al. 1967, Elwell 1968, Robison 1965, Stritzke 1975). The study described here was designed to determine if addition of ammonium thiocyanate to 2,4,5-T, silvex, or amitrole would increase herbicidal effects on salmonberry.

## MATERIALS AND METHODS

A previous study has shown that both late spring and midsummer foliage sprays are effective on salmonberry (Stewart 1974a). Therefore, 240 vigorous salmonberry shrubs 4 to 6 feet (1.2 to 1.8 m) high were selected in a 2-year-old clearcut near Lakeside, Oregon for treatment on May 19 (late spring) or July 25 (midsummer) in 1972. About three-quarters of the salmonberry crowns were fully developed when the shrubs were sprayed on May 19. By July 25 crowns were fully developed, active growth had stopped, and fruits had disseminated. On each date, 10 randomly selected shrubs were treated with one of the formulations shown in table 1. The study was installed as a 3 x 4 x 2 factorial design with 10 replications.

Table 1--*Herbicidal treatments evaluated as late spring and midsummer sprays on salmonberry*

Herbicide and rate (aehg) <sup>1/</sup>	Amount of NH <sub>4</sub> SCN added
	1b aihg <sup>2/</sup>
None	0 1/4 3/4
1 lb 2,4,5-T as butoxyethanol esters	0 1/4 3/4
1 lb silvex as butoxyethanol esters	0 1/4 3/4
1 lb <sup>2/</sup> amitrole as a water soluble liquid	0 1/4 3/4

<sup>1/</sup> Pounds of acid equivalent per 100 gallons of total spray mixture (1 lb is equivalent to 0.45 kg).

<sup>2/</sup> Pounds of active ingredient per 100 gallons of total spray mixture (1 lb/gal is equivalent to 0.12 kg per liter).

Herbicides were applied to drip point on the foliage of each plant using knapsack sprayers. All sprays, except for those containing amitrole, were applied in a 3-percent diesel oil-in-water emulsion carrier; amitrol was applied in water. A special emulsion system containing all additives found in a commercial butoxyethanol ester formulation of 2,4,5-T was used to form the emulsion for ammonium thiocyanate applied without herbicides. In order to measure differences due to addition of ammonium thiocyanate, herbicidal dosages used were one-third the optimum level for best control (Stewart 1974a).

Topkill, number of plants killed (complete topkill with no resprouting), and number and height of basal or root sprouts were observed in August of 1973, 13 to 15 months after sprays were applied. Topkill and number and height of sprouts were analyzed by analysis of variance and treatment differences were compared using sets of orthogonal contrasts. A chi-square test for homogeneity of variance indicated that the herbicides were operating as unrelated populations. Therefore, herbicides were analyzed separately. Because of the small number of plants killed at the herbicidal dosages used, plant kill could not be analyzed. Treatment differences were tested at the 5-percent level of probability.

## RESULTS AND DISCUSSION

Addition of 1/4- or 3/4-lb aihg of ammonium thiocyanate to 2,4,5-T, silvex, or amitrole did not increase degree of topkill or reduce number and size of sprouts (table 2). This lack of response was more evident for the two phenoxy herbicides than for amitrole. Of course, the high degree of topkill obtained with the phenoxy herbicides without ammonium thiocyanate leaves little room for improvement. For late spring sprays of amitrole, average topkill of salmonberry shrubs increased with addition of ammonium thiocyanate. This increase was not statistically significant, however, due to variability in degree of control on individual plants. This variability has also been observed with amitrole-T (Stewart 1974a), and results from repeated sprays (Stewart 1974b) suggest that this may arise from inherited resistance to amitrole in individual salmonberry plants and clones. Ammonium thiocyanate appeared to increase degree of plant kill obtained with amitrole. This result justifies the use of amitrole-T rather than amitrole for salmonberry control.

Late spring sprays of 2,4,5-T and silvex were more effective than midsummer sprays. In late spring, topkill was greater with 2,4,5-T and resprout control better with silvex. Applications made early in the growing season after about three-quarters of the salmonberry crown is fully developed have proved effective (Krygier and Ruth 1961, Stewart 1974a). Conifers, however, are more resistant to phenoxy herbicides applied in midsummer after buds have set. Therefore, midsummer sprays are preferred to release conifers despite reduced effects on salmonberry.

Table 2--Response of salmonberry to  $\text{NH}_4\text{SCN}$  alone and in mixture with 2,4,5-T, silver, and amitrole applied as late spring or midsummer foliage sprays

Herbicide	Amount of $\text{NH}_4\text{SCN}$	Late spring spray				Midsummer spray			
		Top-kill	Plant kill	Average number and height of sprouts		Top-kill	Plant kill	Average number and height of sprouts	
	<sup>1/</sup> lb aihg	- Percent -		Number	cm	- Percent -		Number	cm
None	0	4	0	0	0	4	0	0.4	12
	1/4	1	0	1.4	8	3	0	0	0
	3/4	4	0	0.3	16	13	0	1.1	8
2,4,5-T	0	98	0	6.8	57	90	0	5.8	72
	1/4	99	0	4.5	70	87	0	4.1	84
	3/4	100	40	4.0	70	92	0	7.4	72
Silvex	0	89	10	2.5	68	78	0	9.2	93
	1/4	100	10	3.8	68	96	0	8.4	79
	3/4	90	0	3.7	54	75	0	5.2	88
Amitrole	0	41	10	0.9	19	64	50	1.8	29
	1/4	70	20	1.2	37	50	30	0.7	22
	3/4	84	50	3.4	28	61	80	1.6	10

<sup>1/</sup> Pounds of active ingredient per 100 gallons of total spray mixture (1 lb/gal is equivalent to 0.12 kg per liter).

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Apply pesticides so that they do not endanger humans, livestock, crops, beneficial insects, fish, and wildlife. Do not apply pesticides when there is danger of drift, when honey bees or other pollinating insects are visiting plants, or in ways that may contaminate water or leave illegal residues.

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If your hands become contaminated with a pesticide, do not eat or drink until you have washed. In case a pesticide is swallowed or gets in the eyes, follow the first aid treatment given on the label, and get prompt medical attention. If a pesticide is spilled on your skin or clothing, remove clothing immediately and wash skin thoroughly. Spills of herbicides or spray adjuvants should immediately be cleaned from work surfaces and mixing platforms. Spray adjuvants such as Vistik, Dacagin, Norbak, and foaming agents are especially slippery and should be immediately flushed off with water.

Do not clean spray equipment or dump excess spray material near ponds, streams, or wells. Because it is difficult to remove all traces of herbicides from equipment, do not use the same equipment for insecticides or fungicides that you use for herbicides.

Dispose of empty pesticide containers promptly. Have them buried at a sanitary land-fill dump, or crush and bury them in a level, isolated place.

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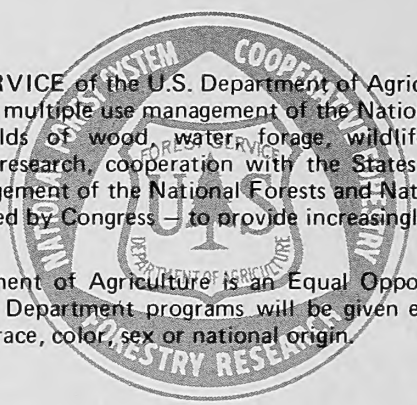
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